CLAIMS

1. An optical fiber coupling apparatus for coupling light from a light-emitting device into an optical fiber, comprising:

   a microactuator for positioning the end of said fiber with respect to said light-emitting device, and

   a control circuit comprising

   outcoupling means for coupling out of said fiber a well-defined portion of the light propagating through the core of said fiber and

   a photodetector for detecting the intensity of said outcoupled light portion,

   said control circuit having a controlled variable and a manipulated variable determined from said controlled variable, wherein

   said controlled variable is the light intensity detected by said photodetector and

   said manipulated variable is a position of the fiber end positioned by said microactuator.

2. The optical fiber coupling apparatus according to claim 1, wherein said outcoupling means comprise an optical fiber coupler or a fiber grating coupler.

3. The optical fiber coupling apparatus according to claim 1, wherein said outcoupling means are such that the intensity of said well-defined light portion is between 0.1 % and

10 % of the intensity of said light propagating through the core of the fiber.

4. The optical fiber coupling apparatus according to claim 3, wherein said outcoupling means are such that the intensity of said well-defined light portion is about 1 % of the intensity of said light propagating through the core of the fiber.

5. The optical fiber coupling apparatus according to claim 1, further comprising a second photodetector for monitoring the operation of said light-emitting device.

6. The optical fiber coupling apparatus according to claim 1, further comprising a microprocessor for processing an output signal of said photodetector and for controlling said microactuator.

7. The optical fiber coupling apparatus according to claim 6, wherein said apparatus is based on a silicon-on-insulator microbench and said microprocessor is integrated on said microbench by a complementary-metal-oxide-semiconductor technology or as a multi-chip module.

8. The optical fiber coupling apparatus according to claim 1, wherein said fiber end is embedded in a multi-degree-of-freedom U-groove of V-groove.

9. The optical fiber coupling apparatus according to claim 1, wherein said microactuator is suited for positioning the fiber end in three dimensions and preferably comprises an electrostatic comb actuator or a series of bimorphic actuators.

10. An optical fiber coupling apparatus for coupling light from an optical fiber into a light-receiving device, comprising:

a microactuator for positioning the end of said fiber with respect to said light-receiving device, and

a control circuit comprising

a reference light source for emitting a reference light signal with an essentially constant intensity and

incoupling means for coupling said reference light signal into the core of said fiber,

said control circuit having a controlled variable and a manipulated variable determined from said cotrolled variable, wherein

said controlled variable is the intensity of said reference light signal coupled into the fiber core and detected by said light-receiving device and

said manipulated variable is a position of the fiber end positioned by said microactuator.

11. The optical fiber coupling apparatus according to claim 10, wherein said incoupling means comprise an optical fiber coupler or a fiber grating coupler.

12. The optical fiber coupling apparatus according to claim 10, further comprising means for separating said reference light signal from other light signals propagating through said fiber core.

13. The optical fiber coupling apparatus according to claim 10, further comprising a microprocessor for processing an output signal of said light-receiving device and for controlling said microactuator.

14. The optical fiber coupling apparatus according to claim 13, wherein said apparatus is based on a silicon-on-insulator microbench and said microprocessor is integrated on said microbench by a complementary-metal-oxide-semiconductor technology or as a multi-chip module.

15. The optical fiber coupling apparatus according to claim 10, wherein said fiber end is embedded in a multi-degree-of-freedom U-groove of V-groove.

16. The optical fiber coupling apparatus according to claim 10, wherein said microactuator is suited for positioning the fiber end in three dimensions and preferably comprises an electrostatic comb actuator or a series of bimorphic actuators.

17. A method for coupling light from a light-emitting device into an optical fiber, comprising the steps of:

positioning the end of said fiber with respect to said light-emitting device;

incoupling light from said light-emitting device into the core of said fiber, so that light propagates through the core of said fiber;

coupling out of the fiber a well-defined portion of the light propagating through the core of said fiber;

detecting the intensity of said light portion; and

performing a control operation, wherein

said detected light intensity is used as the controlled variable from which the manipulated variable is determined in said control operation and

the position of the fiber end is used as the manipulated variable in said control operation.

18. The method according to claim 17, wherein the intensity of said well-defined light portion is chosen to be between 0.1 % and 10 % of the intensity of said light propagating through the core.

19. The method according to claim 18, wherein the intensity of said well-defined light portion is chosen to be about 1 % of the intensity of said light propagating through the core.

20. The method according to claim 17, wherein the Hill climb method is used for determining the position of the fiber end from the intensity of said light coupled into the fiber core in said control operation.

21. A method for coupling light from an optical fiber into a light-receiving device, comprising the steps of:

positioning the end of said fiber with respect to said light-receiving device;

incoupling a reference light signal with an essentially constant intensity into the core of said fiber, so that a portion of said reference light signal propagates through the core of said fiber;

detecting the intensity of said light portion in said light-receiving device; and

performing a control operation, wherein

said detected light intensity is used as the controlled variable from which the manipulated variable is determined in said control operation and

the position of the fiber end is used as the manipulated variable in said control operation.

22. The method according to claim 21, wherein the Hill climb method is used for determining the position of the fiber end from the intensity of said light coupled into the fiber core in said control operation.